

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	Gerhard Karl Strauch
Application No. 10/722,848	Filing Date: November 26, 2003
Title of Application:	Arrangement Comprising a Support Body and a Substrate Holder which is Driven in Rotation and Gas-Supported Thereon
Confirmation No. 8163	Art Unit: 1763
Examiner	Sylvia MacArthur

Commissioner for Patents
Post Office Box 1450
Alexandria, VA 22313-1450

Substitute Appeal Brief Under 37 CFR §41.37

Dear Sir:

A Notification of Non-Compliant Appeal Brief was sent on December 6, 2006. The notification identified that the Summary of the Claimed Subject Matter did not map each independent claim. Applicant submits this Substitute Appeal Brief mapping each independent claim.

(i) Real Party In Interest

The real party in interest is AIXTRON AG, assignee of the patent application.

(ii) Related Appeals and Interferences

There are no related Appeals or Interferences.

(iii) Status Of Claims

Claims 1, 2, and 4-21 stand rejected and are the subject of the instant Appeal. A copy of each of these claims is attached hereto in the Claims Appendix. Claim 3 is cancelled.

(iv) Status Of Amendments

There are no pending or unentered Amendments.

(v) Summary Of Claimed Subject Matter

Claims 1 and 13 are the independent claims.

Independent Claim 1

The present invention, as claimed in independent claim 1, relates to an arrangement comprising a support body (1) and a substrate holder (2) which is supported

thereon and driven in rotation. (par. [0016]). A gas bearing and a rotary drive are formed by means of gas flowing into the separating gap (7) between support body (1) and substrate holder (2) from nozzles (11, 12). (par. [0021]). The support body (1) and the substrate holder (2) are formed as rings. (par. [0016]). The support body includes a ring bead (area of 7 that is a part of 1) which projects into a ring recess (area of 7 that is a part of 2) in the substrate holder (2). (par. [0018]).

Independent Claim 13

The present invention, as claimed in independent claim 13, relates to a device for rapid heat treatment of flat objects (3) having a support body (1) and a substrate holder (2) which is supported thereon and driven in rotation. (par. [0016]). A flat object (3) can be placed on the substrate holder (2). (par. [0017]). A gas cushion is produced beneath the substrate holder (2) by means of gas which emerges from nozzles (11, 12) which open out into a separating gap (7) between support body (1) and holding body. (par. [0021]). The substrate holder (2) rests on the gas cushion in such a manner that it is driven in rotation by directed gas streams. (par. [0022]). The support body (1) and the substrate holder (2) are formed as rings. (par. [0016]). The support body includes a ring bead (area of 7 that is a part of 1) which projects into a ring recess (area of 7 that is a part of 2) in the substrate holder (2). (par. [0018]). The support body (1) and/or substrate holder (2) consist of quartz or ceramic material (par. [0016]), the rotationally driven ring (2) has a low heat absorption (par. [0025]), and the ar-

rangement is part of a device for the heat treatment of semiconductor wafers (3) (par. [0015]).

(vi) Issues To Be Reviewed On Appeal

Claims 1, 2, 4, 5, 9, 10, and 12, stand rejected under 35 U.S.C. §103(a) as being unpatentable over Aschner (US 6,005,226) in view of Switky et al (US 5,270,262).

Claims 6, 8, 11, and 13-20, stand rejected under 35 U.S.C. §103(a) as being unpatentable over Aschner (US 6,005,226) in view of Switky et al (US 5,270,262) and White (WO01/99257).

Claims 7 and 21, stand rejected under 35 U.S.C. §103(a) as being unpatentable over Aschner or Sato in view Switky et al in further view of White (WO 01/99257) as applied in claims 6, 8, 10, 11, and 13-20, in further view of Frijlink (US 4.860.687).

(vii) Argument

The Examiner's rejection of claims 1, 2, and 4-21 under 35 U.S.C. §103(a) is improper because the combination of Aschner, Switky, and White does not result in each and every claimed limitation of independent claims 1 and 13. In particular the combination of these references would not result in a support body with "a ring bead which projects into a ring recess in the substrate holder." Further, the rejection is improper be-

cause there is no motivation to modify or combine Aschner, Switky, and White in accordance with claims 1 and 13.

The Examiner applies Switky to Aschner as the basis for rejecting both claims 1 and 13 with respect to the limitation “the support body includes a ring bead which projects into a ring recess in the substrate holder.” (6/1/06 Final Office Action, pages 2 and 3).

Switky discloses a semiconductor device package 10 with a top plate 11 that is “held in registry” with a bottom plate 14 by means of a plastic ring 12 molded into place. (col. 3 l. 51-55). The top 11 and bottom 14 plates form a cavity “by virtue of a resilient plastic bead 15 which is formed on the leadframe.” (col. 3 l. 65-68). The package thickness is determined by the top 11 and bottom 14 plates being compressed onto the bead 15 and the bead 15 is flattened. (col. 4 l. 47-51, col. 5 l. 60-63). Switky discloses that the objective is to prevent molding from contacting the semiconductor device and to provide a seal that will preclude the entry of fluid. (col. 2 l. 11-12; col. 5 l. 61-65). Switky also discloses that it is beneficial if the top and bottom plates are cemented to bead 15. (col. 5 l. 41-44, l. 53-55). Switky does not disclose that bead 15 projects into any form of recess in either top 11 or bottom 14 plates.

Aschner discloses an RTP processing system comprising a fixed base 310 with a pin 510 centered about an axis of rotation 330 and that fits in a detent 520 in a rotatable wafer holder 410. (col. 4 l. 12-19).

In issuing the rejection of claim 1 and incorporated in the rejection into claim 13, the Examiner notes that Aschner does not disclose "a ring bead projecting into a ring recess in the substrate holder." (6/1/06 Final Office Action, page 2). The Examiner claims that one skilled in the art would be motivated to combine the resilient plastic bead in Switky with the system in Aschner to "provide a seal that precludes the entry of fluid is the joint between the rings for enhanced stability and maintaining of centering during processing." *Id.*

Applicant respectfully submits that claims 1 and 13 are not rendered obvious by Aschner in view of Switky. In order for the claimed invention to be obvious over the prior art, there must be some suggestion or motivation in the cited references to modify or combine the references in accordance with the claimed invention. *See e.g., In re Mills*, 16 USPQ2d 1430, 1432 (Fed. Cir. 1990). Further, the prior art references must teach or suggest all of the claim limitations. *See e.g., In re Dembiczak*, 50 USPQ2d 1614, 1618 (Fed. Cir. 1999).

First, Applicant submits that the combination of Switky and Aschner does not render the claimed invention obvious because such a combination would still not yield all of the limitations of the claims 1 and 13. All claims require "the support body includes a ring bead which projects into a ring recess in the substrate holder." As noted by the Examiner, Aschner does not disclose this limitation. As identified above, Switky does not disclose that bead 15 projects into any form of a recess in either top 11 or bottom 14 plates. Thus, any combination of these references would still fail to render "the support body includes a ring bead which projects into a ring recess in the substrate holder." As a result, claims 1 and 13 are not rendered obvious over the cited references.

Second, Applicant submits that there is no motivation to combine the references as suggested by the Examiner because such a combination would render the device in Aschner unacceptable for its intended purpose. Aschner discloses an RTP system in which wafer holder 410 rotates above fixed base 310. Switky discloses a semiconductor package in which top 11 and bottom 14 plates are compressed on resilient plastic bead 15. Switky also discloses that the top plate is "held in registry" in relation to the bottom plate, i.e. the two plates are held in a fixed position relative to one another. Applicant submits that if the plastic bead in Switky were to be applied to Aschner such that the plastic bead 15 were to be disposed between wafer holder 410 and fixed base 310 the

combination would render the system in Aschner unacceptable for its intended purpose because the wafer holder 410 would no longer be able to rotate above fixed base 310. Although it is not clear how such a combination would be made, it is presumed that the suggested combination is to have a large plastic bead that is disposed between wafer holder 410 and fixed base 310, along the circumference of these elements and in contact with both of these elements. The Examiner notes that the combination would be made to seal the space between these elements from fluids. (6/1/06 Final Office Action, page 2). This requires that the plastic bead be pressed between wafer holder 410 and fixed base 310, as explicitly taught by Switky. Further, Switky discloses that the plastic bead disposed between two plates holds the plates in a fixed position relative to one another. Thus, a plastic bead disposed between wafer holder 410 and fixed base 310 would mean that the wafer holder 410 would no longer be able to rotate above fixed base 310. This would render the device in Aschner unacceptable for its intended purpose. Thus, one skilled in the art would not be motivated to combine these references as suggested by the Examiner.

Third, Applicant submits that there is no motivation to combine these references because they have different objectives. Aschner is concerned with rotating a wafer or wafer holder over a fixed base in an RTP system. The holder and the base are dynamic relative to one another. Switky is concerned with securing two plates to a bead and

protecting the inner cavity that holds a semiconductor chip from the mold and moisture. Unlike Aschner, the device in Switky is a static device, i.e. not dynamic. The elements of Switky are fixed and they do not rotate relative to one another. The Examiner's proposed combination would incorporate the bead that is used to secure two plates to form a semiconductor package and place such a bead in the interface between the rotating wafer holder and a fixed base. Applicant submits that one skilled in the art would not be motivated to combine an element (a plastic bead) that maintains a static system (a semiconductor package) between two elements (a fixed base and a rotating wafer holder) that are dynamic relative to one another. As a result, Applicant submits that this further supports the lack of motivation to combine the references in accordance with the claimed invention.

In fact, the use of the plastic bead to secure the plates within the package indicates that Switky teaches away the use of the plastic bead between two dynamic elements. This also supports the lack of motivation to combine the references.

Fourth, Applicant submits that there is no motivation to combine these references because they are non-analogous art. Aschner is directed to Rapid Thermal Processing systems, which process entire semiconductor wafers. Switky is directed to a semiconductor chip package, a semiconductor chip being a tiny segmented portion of

an overall wafer. Neither reference indicates that technology associated with securing a semiconductor chip within a package could be applied to technology associated with processing an entire semiconductor wafer. Applicant submits that this further supports the lack of motivation to combine the references in accordance with the claimed invention.

Fifth, the difference in scale between a wafer and an individual chip indicates that one skilled in the art would not associate the two different technologies. Considering that in the semiconductor industry processing methods and considerations change as wafer diameter moves from 6 inches to 8 inches, one skilled in the art would not look to a semiconductor chip, a tiny fraction of a wafer, and recognize that the elements incorporated in semiconductor packaging could be applied to a rotatable wafer holder in an RTP system.

Although White is not identified by the Examiner as teaching a support body with “a ring bead which projects into a ring recess in the substrate holder,” Applicant further notes claim 13 is not obvious over Aschner in view of Switky in further view of White.

White discloses a gas bearing rotor 113A that is received by a cavity in a gas bearing base 210. Rotor 113A provides support to cylinder 115 and edge ring 119.

The Examiner identifies the gas bearing base 210 as a support body and the summation of rotor 113A, cylinder 115, and ring 119 as a substrate holder. The gas bearing base 210 comprises a gas support inlet 204, which provides a gas cushion to elevate rotor 113A, and gas rotation inlets 202,206, which provide lateral pressure on rotor 113A and enable rotor 113A to rotate within the cavity of gas bearing base 210. White does not disclose a support body with "a ring bead which projects into a ring recess in the substrate holder." Thus, any combination of White with Aschner and Switky would still fail to yield this limitation.

Further, one skilled in the art would not be motivated to modify White or combine White with Aschner or Switky in accordance with the claim 13 because White teaches away a support body with "a ring bead which projects into a ring recess in the substrate holder." White is directed to addressing the problem of a bearing race 21 "disposed within a well 39 and, as a result of ball bearings 22, rotates relative to a lower bearing race 26." (page 2, l. 1-3). The "sliding and rolling contact associated with the ball bearings leads to particle generation in the processing chamber." (page 2, l. 21-23). Further, "damage and corrosion may be caused to the bearings by the presence of hot gases in these regions." (page 3, l. 14-16). As a result, White seeks to provide "a gas bearing to support a rotor coupled to a substrate support." (page 3 l. 23-24). White discloses that "edge ring 119... is mounted on the support cylinder 115. The

support cylinder 115 is coupled to the rotor 113.” (page 6 l. 14-16). Thus, White is directed towards providing an alternative rotational mechanism for an object that extends away from a substrate support (in this case a rotor) and is inserted into a well. In order for White to be modified and directed to claim 13, White would effectively have to be inverted. Applicant respectfully submits that one skilled in the art would not be motivated by White to invert its teachings.

The lack of motivation to modify White also comes from the fact that such modification would change the principle of operation of White. Such a modification would require the rotor extending away from the substrate support to no longer be inserted into a well. Thus, the gas bearing would no longer provide support to the rotor. Applicant respectfully submits that such a modification would change the principle of operation of the device disclosed in White. As a result, one skilled in the art would not be motivated to modify White in accordance with claim 13.

Conclusion

For all of the foregoing reasons, it is submitted that the claimed invention is patentable over the cited art. Accordingly, it is submitted that the rejection of claims 1, 2 and 4-21 should be reversed and it is respectfully requested that the Examiner be directed to issue a Notice of Allowance allowing the claims.

Respectfully submitted,

/s/

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Wesley W. Whitmyer, Jr., Registration No. 33,558
Christopher H. Strate, Registration No. 57,376
Attorneys for Applicant
ST.ONGE STEWARD JOHNSTON & REENS LLC
986 Bedford Street
Stamford, CT 06905-5619
203 324-6155

**Claims Appendix
to Appeal Brief Under 37 CFR §41.37
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1. Arrangement comprising a support body and a substrate holder which is supported thereon and driven in rotation, a gas bearing and a rotary drive being formed by means of gas flowing into the separating gap between support body and substrate holder from nozzles, characterized in that the support body and the substrate holder are formed as rings, and the support body includes a ring bead which projects into a ring recess in the substrate holder.
2. Arrangement according to Claim 1, characterized in that the rings rest on top of one another in a self-centering fashion.
4. Arrangement according to Claim 1, characterized in that the substrate is supported on the ring which is driven in rotation only by means of its edge.
5. Arrangement according to Claim 1, characterized in that the substrate rests on the ring with minimal contact, preferably only on the tips of needle-like protuberances.
6. Arrangement according to Claim 1, characterized in that the nozzles open out into arcuate grooves.
7. Arrangement according to Claim 1, characterized in that the nozzles open out into arcuate grooves with alternating preferred directions of gas flow streams, said streams flowing in opposite directions.

8. Arrangement according to Claim 1, characterized by oppositely directed driving gas streams for rotationally bearing and rotationally driving the rotating ring.
9. Arrangement according to Claim 1, characterized in that the substrate is radiation-heated from below through the rings.
10. Arrangement according to Claim 1, characterized in that the support body and/or the substrate holder consist of quartz or ceramic material.
11. Arrangement according to Claim 10, characterized in that the rotationally driven ring has a low heat absorption.
12. Arrangement according to Claim 11, characterized in that the arrangement is part of a device for the heat treatment of semiconductor wafers.
13. Device for the in particular rapid heat treatment of flat objects, having a support body and a substrate holder which is supported thereby in such a manner that it can be driven in rotation and on which the flat object can be placed, it being possible to produce a gas cushion beneath the substrate holder by means of gas which emerges from nozzles which open out into a separating gap between support body and holding body, on which gas cushion the substrate holder rests in such a manner that it is driven in rotation by directed gas streams, characterized in that the support body and the substrate holder are formed as rings, the support body includes a ring bead which projects into a ring recess in the substrate holder, the support body and/or the substrate holder consist of quartz or ceramic material, the rotationally driven ring has a low heat absorption, and the arrangement is part of a device for the heat treatment of semiconductor wafers.

14. Arrangement according to Claim 1, wherein the nozzles open out into the separating gap and open out into grooves.
15. Arrangement according to Claim 14, wherein said grooves are formed in the mating surface of said support body opposite the mating surface of said substrate holder.
16. Arrangement according to Claim 15, wherein each nozzle opens out into the proximal end of a corresponding groove.
17. Arrangement according to Claim 16, wherein gas emerging from each nozzle flows in a preferred direction from the proximal end of each groove to the distal end of each groove.
18. Arrangement according to Claim 17, wherein said grooves are distributed on the surface of said support body such that there are alternating preferred directions of gas flows.
19. Arrangement according to Claim 18, wherein said preferred directions are opposite directions.
20. Arrangement according to Claim 19, wherein a portion of said grooves are formed in the surface of said ring bead.
21. Arrangement according to Claim 20, wherein said grooves are arcuate grooves.

**Evidence Appendix
to Appeal Brief Under 37 CFR §41.37
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No evidence of any kind, including evidence submitted under 37 CFR 1.130, 1.131 or 1.132, has been entered by the Examiner and relied upon by Appellant in the appeal.

**Decisions Appendix
to Appeal Brief Under 37 CFR §41.37
Serial No. 10/722,848**

There are no related Appeals or Interferences. As such, there are no decisions rendered by a court or the Board in any such Appeals or Interferences.